

## Abstracts of Technical Articles by Bell System Authors

*Tentative Standards for Wood Poles Become Approved American Standards.*<sup>1</sup> RICHARD C. EGGLESTON. The six American Tentative Standards covering specifications for wood poles, several of which were approved by the American Standards Association as tentative in 1931 and the rest in 1933, have now been reviewed by the ASA committee and approved by the ASA as full American Standards. In reviewing the standards, the committee found that the general principles of the standard requirements have been universally recognized as a satisfactory basis for the selection of poles. Covering as they do northern white cedar poles, western red cedar poles, chestnut poles, southern pine poles, lodgepole pine poles, and Douglas fir poles, the standards represent a rational uniform standardization system for the six major pole timbers of the United States.

The standards establish practical limits that can be applied economically in the production of poles for general use, but they are intended also to be flexible enough to cover the purchase of poles of high quality for special purposes. At the same time, it is not desired that they should be so restrictive that any considerable quantity of usable poles produced under normal production practices would be labeled substandard because of the specification restrictions.

The standard specifications include material requirements for shape and straightness of grain, limit defects such as knots, checks, insect damage and decay, and define the minimum quality of acceptable poles. In the standards, departures from straightness are held within practical limits for ordinary use. Decay and the presence of wood-rotting fungi are generally prohibited. Definite limitations on knots are set, and fire-killed poles are acceptable only by special agreement between producer and purchaser.

The standard dimensions now included with the specifications in one standard for each type of pole, were based on recommended fibre stresses contained in the American Standard for Ultimate Fiber Stresses of Wood Poles (05a-1930). They were approved as American Standards from their inception, and until they were included with the specifications in the present American Standards they were considered as separate standards. These standard dimensions have all been prepared according to the same principles for all types of poles. The sizes at six feet from the butt in all six standards have been so fixed with respect to ground-line resisting moments,

<sup>1</sup> *Industrial Standardization*, June 1941.

that, for any given class and length of pole, all six species are equal in strength. In calculating these six-feet-from-butt sizes, distance from the butt to the ground line for any given pole was assumed, by definition, to be as shown in the column in the tables headed "Ground Line Distance from Butt." The equality-in-strength principle holds good, however, for any reasonable depth of set required.

Approval of the six standards at this time followed a policy adopted by the Standards Council of the American Standards Association in April 1939. At that time the Standards Council decided to withdraw approval of standards having a tentative status, and requested the reconsideration of such standards with the idea of either discarding them or of advancing them to American Standards.

*Equilibrium Relations in the Solid State of the Iron-Cobalt System.*<sup>2</sup> W. C. ELLIS and E. S. GREINER. There are important transformations in the solid in the iron-cobalt system. One of these originates from the  $A_3$  transformation in iron. Cobalt in the binary system at first raises the  $A_3$  transformation to a maximum in the region of 45 weight per cent cobalt. Further additions decrease the temperature of transformation which rapidly approaches room temperature in the region of 80 weight per cent cobalt. An extended two phase region from 76.5 to 88.5 weight per cent cobalt was established at 600 degrees Cent. (1110 degrees Fahr.).

An order-disorder transition occurs in the alpha phase in the region of 50 weight per cent cobalt. The critical temperature of order is in the neighborhood of 700 degrees Cent. (1290 degrees Fahr.) depending upon the composition. The ordered arrangement has the cesium chloride structure.

The lattice constants of the alpha phase deviate widely from a linear function of the cobalt content. The first additions of cobalt increase the cell size to a maximum at approximately 20 per cent cobalt. Further additions result in a contraction in the cell size to the limit of the alpha phase. Compositions in the region of 50 per cent cobalt exhibit an increase in cell size on ordering.

*Determination of Microphone Performance.*<sup>3</sup> F. L. HOPPER and F. F. ROMANOW. Methods of determining the performance characteristics of microphones by acoustic measurements are described. Work factors involving the accuracy of the methods are discussed. The correlation between a microphone's performance as determined by acoustic measurement and by listening tests is reported. Application of both types of test to a studio type of cardioid microphone is given as an example.

<sup>2</sup> *Trans. Amer. Soc. for Metals*, June 1941.

<sup>3</sup> *Jour. Soc. of Motion Picture Engineers*, April 1941.

*Room Noise Spectra at Subscribers' Telephone Locations.*<sup>4</sup> DANIEL F. HOTH. That room noise can be a distinct handicap to conversation by masking the speech sounds in the ear of the listener and thus impairing the ease and accuracy of reception is of considerable concern to the telephone engineer. Room noise not only complicates the problems involved in the design and engineering of telephone systems capable of affording satisfactory service, but it is also one of the factors which affect the costs of the telephone plant. The effects of noise on telephone conversation depend, of course, upon the characteristics of the noises which occur at the places where telephones are being used. The arrangements and practices necessary for reducing the effects of noise depend upon a knowledge of these characteristics. As a result numerous measurements of room noise have been made from time to time over a period of many years by Bell System engineers. For the most part such measurements have involved the determination of a single figure to represent the noise measured, as in the recent survey of sound levels described by Mr. D. F. Seacord in the July 1940 issue of *The Journal of the Acoustical Society of America*. While such measurements are invaluable in providing information on the frequency of occurrence of different noise levels at telephone locations, their value is enhanced by additional measurements of the distribution of the noise energy throughout the frequency band involved in the reception of speech. The present paper describes such measurements and shows the effects of a number of contributing factors on the spectrum of the noise. It is shown that the spectrum of room noise has a characteristic shape.

*Film Scanner for Use in Television Transmission Tests.*<sup>5</sup> AXEL G. JENSEN. This paper describes the design and construction of a television film scanner primarily intended for use as a testing tool in designing circuits suitable for television program transmission.

The equipment employs electronic scanning and the image dissector is used as the electronic pickup device. The image dissector has a high degree of linearity between light input and signal output and the picture signal is not accompanied by any spurious shading signals. Furthermore, the direct-current component of the television signal is directly available at the output of the tube. The lower sensitivity of the dissector tube is not important in this case since a highly efficient optical projection system makes it possible to override noise to a high degree.

In film scanners for entertainment purposes it is desirable to use ordinary 24-frame motion pictures and such film scanners therefore include a me-

<sup>4</sup> *Jour. Acous. Soc. Amer.*, April 1941.

<sup>5</sup> *Proc. I.R.E.*, May 1941.

chanical or optical translating mechanism for translating the 24-frame film picture into a 30-frame interlaced television picture. In the present equipment it was found more expedient to simplify the construction by allowing the use of specially printed film. Ordinary 24-frame film is "stretched" by printing every other frame twice and the remaining frames three times in succession, thereby producing a film with a total of 60 frames instead of the original 24. Vertical scanning is then obtained by the continuous motion of this film at the rate of 60 frames per second and horizontal scanning by a simple electronic line sweep in the dissector tube.

*Acoustic Design Features of Studio Stages, Monitor Rooms, and Review Rooms.*<sup>6</sup> D. P. LOYE. A survey was made of studio experience, and measurements were made of stages, review rooms, and other units. These data were correlated and used as a valuable guide in the determination of the optimum characteristics and dimensions recommended for major studio scoring stages, monitor rooms, dubbing rooms, review rooms, and studio theaters.

Information regarding Hollywood preview theaters is included in an Appendix.

*A New Microphone Providing Uniform Directivity over an Extended Frequency Range.*<sup>7</sup> R. N. MARSHALL and W. R. HARRY. A new microphone is described which consists of a moving coil pressure element combined with an improved ribbon pressure gradient element to give a cardioid directional characteristic. The theory of operation is reviewed, and consideration is then given to variations in directivity caused by diffraction, separation of the elements, and disparities in their phase and response characteristics. It is then shown how these variations are largely eliminated by equalization in the electrical circuit so that the resulting directivity is practically independent of frequency throughout the range from 70 to 8000 cycles. The use of a moving coil pressure element makes high efficiency possible, while the design of an unusually rugged ribbon element provides a marked reduction in noise due to air currents. Several useful directional patterns in addition to the cardioid pattern are provided in the new microphone, and the theory and merits of these patterns are presented. Finally some of the results which were obtained in field trials of the new microphone are discussed.

*The Magnetostriction, Young's Modulus and Damping of 68 Permalloy as Dependent on Magnetization and Heat Treatment.*<sup>8</sup> H. J. WILLIAMS, R. M.

<sup>6</sup> *Jour. Soc. of Motion Picture Engineers*, June 1941.

<sup>7</sup> *Jour. Acous. Soc. Amer.*, April 1941.

<sup>8</sup> *Phys. Rev.*, June 15, 1941.

BOZORTH and H. CHRISTENSEN. This paper describes measurements of the changes in certain physical properties of 68 Permalloy that result from different thermal and mechanical treatments and considers them in relation to the domain theory. The magnetostriction varied with heat treatment from  $2.5 \times 10^{-6}$  to  $22 \times 10^{-6}$ . The change in Young's modulus with magnetization to saturation varied from 0.09 to 10.5 per cent. The damping of mechanical vibrations was also measured as dependent on magnetization and heat treatment. Young's modulus and the damping constant were determined by measuring the natural frequency of vibration and the width of the resonance curve of a hollow rectangle magnetized parallel to its sides so that the magnetic circuit was complete without air gaps or end effects.